

# Multifunctional materials for electronics and photonics

**Dr. Federico Rosei**

Centre for Energy, Materials and Telecommunications, INRS

**DATE:** Monday, October 27, 2014

**TIME:** 1:00 P M

**PLACE:** C2004

Donuts and coffee will be available for consumption 10 minutes before the colloquium.

**ABSTRACT:** The bottom–up approach is considered a potential alternative for low cost manufacturing of nanostructured materials [1]. It is based on the concept of self–assembly of nanostructures on a substrate, and is emerging as an alternative paradigm for traditional top down fabrication used in the semiconductor industry. We demonstrate various strategies to control nanostructure assembly (both organic and inorganic) at the nanoscale. Depending on the specific material system under investigation, we developed various approaches, which include, in particular: (i) control of size and luminescence properties of semiconductor nanostructures, synthesized by reactive laser ablation [2]; (ii) we developed new experimental tools and comparison with simulations are presented to gain atomic scale insight into the surface processes that govern nucleation, growth and assembly [3-7]; (iii) we devised new strategies for synthesizing multifunctional materials for electronics and photovoltaics [8-19].

**REFERENCES:** F. Rosei, *J.Phys.Cond.Matt.* 16, S1373 (2004); [2] D. Riabinina et al., *Phys.Rev.B* 74, 075334 (2006); [3] K. Dunn et al., *Phys.Rev.B* 80, 035330 (2009); [4] F. Ratto et al., *Small* 2, 401 (2006); [5] F. Ratto et al., *Phys.Rev.Lett.* 96, 096193 (2006); [6] F. Ratto et al., *Nanotechnology* 19, 265703 (2008); [7] F. Ratto et al., *Surf.Sci.*, 602, 249 (2008); [8] F. Ratto, F. Rosei, *Mater.Sci.Eng.R* 70, 243 (2010); [9] O. Moutanabbir et al., *Phys.Rev.B* 85, 201416 (2012); [10] C. Yan et al., *Adv.Mater.* 22, 1741 (2010); [11] C. Yan et al., *J.Am.Chem.Soc.* 132, 8868 (2010); [12] R. Nechache et al., *Adv.Mater.* 23, 1724 (2011); [13] R. Nechache et al., *Appl.Phys.Lett.* 98, 202902 (2011); [14] B. Aïssa et al., *Appl.Phys.Lett.* 99, 183505 (2011); [15] G. Chen et al., *Chem.Comm.* 47, 6308 (2011); [16] G. Chen et al., *Chem.Comm.* 48, 8009 (2012); [17] T. Dembele et al., *J.PowerSources* 233, 93 (2013); [18] S. Li et al., *Chem.Comm.* 49, 5856 (2013); [19] R. Nechache et al., *Nature Photonics*, in press (2014).

**ALL ARE WELCOME!!!**